Astronomy 221 Laboratory --- Rice University --- 2015 Spring Semester

OBSERVING THE NIGHT SKY

1. Introduction

This laboratory is intended to expose students in primarily academic (non-SE, although SE students are welcome) disciplines to astronomical observing techniques using small telescopes. In addition, students will learn about astronomical objects and the night sky (constellations, stars, nebulae, galaxies, and motions of the Earth and sun, moon, and planets. The lab combines outdoor and indoor activities: the indoor (non weather dependent!) aspects being weekly lectures and computer-assisted projects, but the real excitement of the lab is the experience of observing astronomical objects under dark skies and through telescopes for the first time. It is an experience that will remain with you throughout the rest of your life!

The lab is structured around students doing three projects: The first is the introductory (fun) lab "Observing the Night Sky" which will introduce you to the stars and constellations of the winter sky as well as viewing the moon, star clusters, nebulae, and nearby galaxies with our computerized 16inch telescope at the campus observatory. Mars is visible in the evening sky in January (as well as Jupiter late evenings). We will have one or more field trips to George Observatory in Brazos Bend State Park come February(and, for insomniacs, we will have some early morning viewing sessions to see objects in the "summer evening" sky and look at Saturn (really worth getting up for…!), (and maybe glimpse Mercury before sunrise). The second project involves learning the basics of astronomy through weekly lectures and interactively learning about the celestial sphere built around the astronomy simulation program *Stellarium*. This is an essential part of the lab since most enrolled have not had any formal astronomy courses previously. Finally, the third project, which is your "final exam," is to learn how to set up a small, computerized "go-to" telescope and find various types of astronomical objects determined by the telescope computer. You will have 24/7 access to two computerized telescopes in Brockman and are encouraged to take one out to a dark site outside Houston one night for some real observing given the fainter objects visible from a darker location.

The ***workload*** will average about 2-3 hours per week for most weeks: one hour lectures (attendance mandatory) and ~2 hours observing sessions (when the weather permits) or "homework" doing exercises with the ***Stellarium*** program. Early on in the semester you should try to find a "partner" to do the independent observing (and even the computer exercises) with. Partnering with someone (or another group) who is (are) "mobile" (i.e., have a car) would be very useful for getting extra credit and the most out of the third lab. During the first half of the semester we will observe with the 16inch at the campus observatory located atop Brockman Hall; during the second half you will do the "go-to" telescope training and observing there on the terrace (and maybe out of town at sites suggested by the prof).

Note: THE WEATHER FACTOR MAKES THIS LAB DIFFERENT FROM ANY OTHER AND YOU MUST ADJUST YOUR SCHEDULE TO ACCOMMODATE THIS!

2. Prof & Textbook

***Professor*:** Dr. Reginald Dufour (TA: Andy Liao – very knowledgeable with the telescopes and helpful from previous years experience)

Office: Rm. 346 Herman Brown Hall

Telephone: X3348 (713-254-1476 cellular) – doesn't do texting!

Email: rjd@rice.edu

Office Hours: 2-4PM M&W (or email for an appointment)

Textbook*:** "Nightwatch – A Practical Guide to Viewing the Universe" (required)*** by Terence Dickinson © 2006 Firefly Books (relatively inexpensive @ $35 or less on the web)

Software: STELLARIUM – http://www.stellarium.org (free! Has versions for PCs, Macs, & even Linux computers. Download the manual also.)

For the nighttime observing it is suggested that you buy a flashlight with a red filter (available at Wal-Mart, Academy, amazon.com, etc.) and a lab notebook for taking notes in the lectures and while observing. Come prepared…! (but note there are now light apps for smart phones…get one that you can change color and set it to red)

***Lab Web Site*:** http://www.ruf.rice.edu/~rjd/astr221.html (this is the prof's one on his RUF site used previous years; one on OWLSPACE that you should be auto-linked to is being also being developed as the semester evolves)

You should routinely check these sites for announcements, etc. This is very important given that some of the activities are weather-dependent. Checking the sites on Sunday nights or Monday mornings is the preferred procedure for being updated about lab matters for the week ahead.

3. Schedule

During the first week of classes we will have an important orientation meeting to set the times and night for the weekly lectures during the semester (detailed schedule to be given later). Below is an outline of the lab timelines and report due dates (approximate due to semester schedules and weather). To great extent the due dates on the observing labs (1 & 3) are weather dependent but at least a week advance notice will be given.

January

Students will start observing the introductory lab ("***Observing the Night Sky***") and we will have several lectures on the celestial sphere, telescopes, and observing techniques, including installing "***Stellarium"*** software. Most observing will be done at the campus observatory, but one or more Sunday night trips to George Observatory will be arranged in late January or early February. During cloudy nights you should explore the "virtual night sky" using "***Stellarium"*** software on your computer. A write-up report on the first lab will be due by about the mid-term break since it is weather dependent the exact date is TBA.

February

Observing at the campus observatory continues up to midmonth with the write up on the first lab due around mid-term. The lectures will concentrate on learning about astronomical objects and celestial motions. The lecture after mid-term will be on using the new G5 mounts "go-to" telescopes and setting up individual training sessions at the campus observatory. Thereafter, you and your partner are "on your own" (i.e. no more lectures!).

March

This is "prime" observing season (usually!) with weather more conducive to transparent skies and low humidity so we will begin the third lab whereby you will learn how to set up and use a small, computerized telescope (we have two 8inch Cassegrains with new G5 computerized "go-to" mounts) to automatically find and observe a variety of astronomical objects. What you will be learning here in the "***Using a Computerized Telescope"*** lab are the same procedures we use with the bigger 16inch telescope (as well as the giant research telescopes). This lab requires at least two observing sessions; one with Dr. Dufour or the TA to learn how to set up and use the telescope and a second "final exam" observing session where you are expected to set up and use the telescope without outside help. The second (indoor) lab (which is in the form of a take-home exam) must be completed in March and the turned in for grading by Thanksgiving recess. There will not be any required lectures during the last several weeks of classes.

April

The laboratory concludes with the write up on the third lab normally due by the last day of classes. If the weather in April is judged by the Prof to be poor, the due date for the last observing lab might be pushed back to the end of final exams. Note however, such extensions will only be determined by weather or equipment problems, and not student procrastination!

4. Your "Guaranteed" Grade**

The grading system is points-guaranteed::

>100 = Å+

90+ = Å- or higher

80-89 = B- to B+

70-79 = C- to C+

60+ for a pass (D- or higher)

Lab Values:

Introduction to Telescopes & Observing: up to 30 points + up to 5 points extra credit for observing at a dark site outside the Houston light dome.

Take home exam on the lectures and Stellarium: up to 40 points.

Using a Computerized Telescope: up to 30 points + up to 5 points extra credit for observing at a dark site.

*****How to screw-up this fun lab:***

NOTE! ➔ *Mother Nature gives us limited (~25%) good weather in the winter-spring!;* ***so if you guide your efforts by personal convenience rather than by what opportunities the weather gives you, you are doomed to have a poor grade with the observing labs.*** *Also, missing many of the lectures will impact your performance on the second lab if you have not had any previous astronomy courses. Attendance in the lectures will be taken and excuses for missing should be emailed to the prof in advance and (usually) would be granted given that you and he should schedule a "makeup" meeting in his office later in the week for a personal review of the material covered.*

Students with any disabilities that they feel may impact their ability to perform the required work for this laboratory should discuss this with Dr. Dufour (who, BTW, has hearing and walking disabilities). We will try to adjust the observing requirements appropriately and try to provide any special assistance necessary for students with disabilities.

RJD 1/11/2015